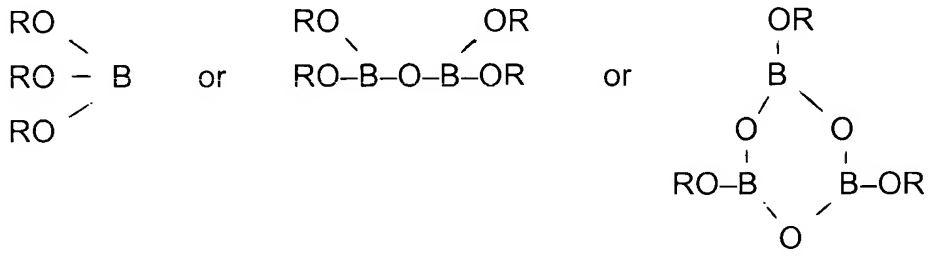


(C-I-1) (C-I-2) (C-I-3)

wherein in formulae (C-I-1), (C-I-2) and (C-I-3), each R is independently n-butyl, isobutyl, amyl, 4-methyl-2-pentyl, 2-ethyl-1-hexyl, isooctyl, decyl or dodecyl; and

(D) optionally a zinc dialkyl dithiophosphate, provided the phosphorus content of the lubricating oil composition does not exceed about 0.10% by weight.

A version of the above amended claims marked to indicate the specific amendments may be found in the attached Appendix.

REMARKS

Claim 1 has been amended. Claims 21-23 have been added. Claims 1-23 are in the application upon entry of this amendment. Entry of this amendment, and reexamination and reconsideration of the present application are respectfully requested in light of the above amendments and the following remarks.

Claim 1 has been amended by deleting boron-containing compound (C-II) from the claim.

Claims 21-23 have been added. Each of these claims specify that component (C) is a borated ester represented by one or more of formulae (C-I-1), (C-I-2) or (C-I-3) and that each R is independently n-butyl, isobutyl, amyl, 4-methyl-2-pentyl, 2-ethyl-1-hexyl, isooctyl, decyl or dodecyl. Support for the definition of R in these claims can be found in the applicants' specification at page 20, lines 16-17.

Claims 1-20 have been rejected under 35 U.S.C. §103(a) as unpatentable over Nalesnik et al. (U.S. Patent 6,103,674) in combination with the teachings in Davis (U.S. Patent 4,584,115), Horodysky (U.S. Patent 4,692,257), or Baranski et al. (U.S. Patent 5,698,499). Claims 1-20 also have been rejected under 35 U.S.C. §103(a) as

unpatentable over the teachings in DeVries et al. (U.S. Patents 4,265,773 or 4,285,822) taken in combination with the teachings in Davis, Horodsky or Baranski et al. These rejections are respectfully traversed for the following reasons.

The applicants' claimed invention relates to a lubricating oil composition comprising: (A) a base oil; (B) a molybdenum and sulfur containing composition derived from a basic nitrogen containing compound, a molybdenum compound and carbon disulfide; (C) certain borated esters; and optionally (D) a phosphorus containing compound provided the amount of phosphorus does not exceed about 0.10% by weight.

Zinc dialkyl dithiophosphates (ZDDP) are known for use as antiwear and antioxidant additives in engine lubricating oil compositions. In the past typical concentrations of phosphorus contributed to the lubricating oil compositions by these compounds exceeded 0.10% by weight. However, ILSAC GF-3 requirements limit the amount of phosphorus that can be used in a lubricating oil composition to a maximum concentration of 0.10% by weight, and it is believed that GF-4 may limit the amount of phosphorus to a maximum concentration of 0.05% by weight. The problem therefore is to provide for a reduction in the amount of phosphorus-containing additives used in these lubricating oil compositions and yet provide the lubricating oil with sufficient properties to pass certain required engine tests including the GF-3/GF-4 Sequence VIII Bearing Corrosion Engine Test.

Nalesnik et al. and DeVries et al. disclose the use of molybdenum and sulfur containing compositions in lubricating oil compositions as antiwear agents and antioxidants. Nalesnik et al. discloses the replacement of part of the ZDDP in a lubricating oil composition with such molybdenum and sulfur containing compositions to restore antiwear and antioxidant properties lost with the reduction in ZDDP. However, a problem with the use of these molybdenum and sulfur containing compositions as partial replacements for ZDDP is that the resulting lubricating oil formulations exhibit poor performance results when tested with ZDDP GF-3/GF-4 Sequence VIII Bearing Corrosion Engine Test. This is evident from the results for Examples X-1 and X-2 which are provided in the applicants' specification at pages 25-27. In Examples X-1 and X-2, comparative tests outside the scope of the applicants' claims were conducted. These examples employed the use of a molybdenum and sulfur containing composition as a partial

replacement for ZDDP which was used at a reduced level. The GF-3/GF-4 Sequence VIII test results for these examples were poor.

The applicants discovered that when certain borated esters were used significant improvements in the GF-3/GF-4 Sequence VIII test results could be achieved. This is evident from the results achieved with Examples 1-3 which are also disclosed at pages 25-27 of the applicants' specification. In Examples 1-3, lubricating oil formulations were used that contained a low level of ZDDP, a molybdenum and sulfur containing composition, and tri-n-butyl borate (a borated ester). The results for Examples 1-3 when compared to the results for Examples X-1 and X-2 clearly show improved GF-3/GF-4 Sequence VIII performance when the borated ester was used.

Neither Nalesnik et al. nor DeVries et al. disclose or suggest use of the borated esters specified in the applicants' claims. To make up for the deficiencies in the teachings in these references, the Examiner cites Davis, Horodysky and Baranski et al. Davis discloses the use of certain borated epoxides as lubricant additives. Horodysky discloses the use of certain borated hydrocarbyl viscinal diols as lubricant additives. Baranski et al. discloses the use of certain phenolic borates as lubricant additives. However, none of these references disclose or suggest combining the boron compounds disclosed therein with the molybdenum and sulfur containing compositions disclosed in Nalesnik et al. or De Vries et al. in a lubricating oil composition characterized by a low level of or the absence of phosphorus as specified in the applicants' claims. None of the cited references provide the required motivation for combining the teachings of either Nalesnik et al. or DeVries et al. with the teachings in Davis, Horodysky or Baranski et al.

The Examiner contends that the motivation to combine the teachings in Nalesnik et al. with the teachings in Davis, Horodsky or Baranski et al. is provided in Nalesnik et al. at column 10, lines 53-55, wherein the reference discloses that "organo borates" can be added to the disclosed lubricating oil compositions. Nalesnik et al. does not identify any specific organo borates that may be used, and the reference certainly does not disclose or suggest the borated esters specified in applicants' claims. Moreover, the applicants discovered that not all organo borates provide the solution to the problem that they sought to overcome. For example, the applicants discovered that the addition of a borated

polyisobutene substituted succinimide to a lubricating oil composition containing a reduced level of ZDDP and the molybdenum and sulfur containing composition specified in the applicants' claims was not sufficient to provide the desired improvement in the GF-3/GF-4 Sequence VIII test. In this regard, a comparison of the results for applicants' Examples 1-3 wherein tri-n-butyl borate (a borated ester) was used as the boron-containing compound to the results for Example X-3 wherein a borated polyisobutene substituted succinimide was used as the boron-containing compound clearly indicates significantly improved results for Examples 1-3 as compared to Example X-3. Thus, it is respectfully submitted that the mere suggestion in Nalesnik et al. that organo borates could be added to the lubricating composition disclosed therein would not have been sufficient motivation to the skilled artisan to combine the teachings in Nalesnik et al. with the teachings in Davis, Horodsky or Baranski et al. to overcome the applicants' problem and arrive at the applicants' claimed invention.

The Examiner contends that the motivation to combine the teachings in DeVries et al. with the teachings in Davis, Horodysky or Baranski et al. is provided by the disclosure in DeVries et al. that the addition of "conventional additives" to the disclosed lubricant compositions are permitted. DeVries does not indicate, however, that any of these conventional additives can be a boron containing compound, much less a borated ester as specified in applicants' claims. None of these references disclose or suggest that improved GF-3/GF-4 Sequence VIII test results could be achieved if the borated esters specified in applicants' claims were added to the lubricating oil compositions disclosed in DeVries et al. Thus, it is respectfully submitted that the disclosure in DeVries et al. that conventional additives could be added to the lubricating compositions disclosed therein would not have been sufficient motivation to the skilled artisan to combine the teachings in DeVries et al. with the teachings in Davis, Horodysky or Baranski et al. and in doing so overcome the applicants' problem and arrive at the applicants' claimed invention.

Withdrawal of the rejections of claims 1-20 for obviousness over the teachings in Nalesnik et al. or DeVries et al. taken in combination with the teachings in Davis, Horodsky or Baranski et al. is believed to be warranted and is respectfully requested

Applicants respectfully submit that the application is now in condition for allowance. A Notice of Allowance is respectfully submitted.

Respectfully submitted,

THE LUBRIZOL CORPORATION

By _____

Neil A. DuChez
Reg. No. 26,725

29400 Lakeland Boulevard
Wickliffe, Ohio 44092-2298
(216) 621-1113

Appendix

Claim 1 has been amended as follows:

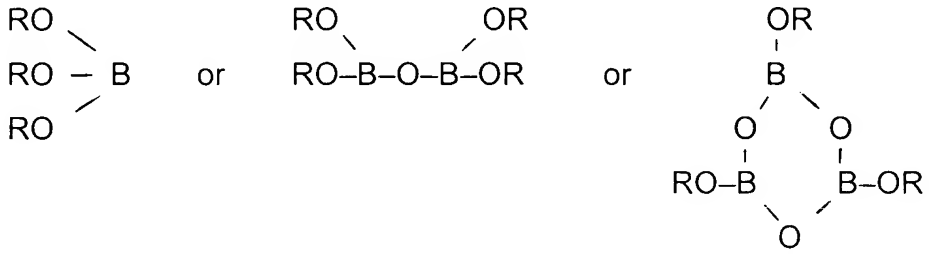
1. A lubricating oil composition, comprising:

(A) a base oil;

(B) a molybdenum and sulfur containing composition derived from a basic nitrogen containing compound, a molybdenum compound and carbon disulfide;

(C) [a boron-containing compound selected from the group consisting of:

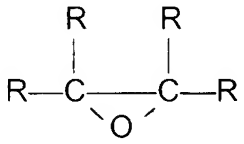
(C-I)] a borated ester represented by one or more of the formulae



(C-I-1) (C-I-2) (C-I-3)

wherein in formulae (C-I-1), (C-I-2) and (C-I-3), each R is independently a hydrocarbon group and any two adjacent R groups may together form a cyclic group;

[(C-II) at least one borated epoxide comprising the product made by reacting a boron reactant with one or more epoxides represented by the formula



(C-II-1)

wherein in formula (C-II-1) each R is independently hydrogen or a hydrocarbon group and any two adjacent R groups may together form a cyclic group, with the proviso that when a single epoxide is used the total number of carbon atoms in the R groups does not exceed about 12, and when a mixture of epoxides is used the average on a mole basis for the total number of carbon atoms in the R groups for the mixture does not exceed about 12; and

(C-III) mixture of (C-I) and (C-II);] and

(D) optionally a phosphorus containing compound, provided the phosphorus content of the lubricating oil composition does not exceed about 0.10% by weight.